

REMARKS

Claims 16-25 remain pending in this application. Favorable reconsideration is respectfully requested. Claims 16-18, 20, 22, and 24 are independent claims.

In the Office Action, Claims 16-25 were rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over Claim 3 of U.S. Patent 6,379,211 or Claim 10 of U.S. Patent 6,267,636 (both are parents of the present application), alone or in view of European Patent Application EP 0 788 130 A2 (Yamanobe '130). Claims 16-25 also were rejected under 35 U.S.C. § 102(a) as being anticipated by Japanese document 10-188778, and the Office Action refers to corresponding English text in U.S. Patent 6,008,569 (Yamanobe '569) in support of the rejection. Claims 16-25 also were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent 5,853,310 (Nishimura et al.) in view of Yamanobe '130.

Applicants respectfully traverse the above rejections for the following reasons.

The double patenting rejection will first be addressed.

Claim 16 is directed to a method of manufacturing an electron source. The method comprises an exposing step and an introducing step. In the exposing step, a surface of a substrate, on which plural electron-emitting devices are to be formed, is exposed to a sealed atmosphere. In the introducing step, a gas containing carbon is introduced into the sealed atmosphere. The sealed atmosphere is formed by a chamber, and the chamber is heated before the introducing step.

A notable feature of Claim 16 is that the chamber is heated before the step of introducing the gas containing carbon into the sealed atmosphere is performed.

Claim 3 of U.S. Patent 6,379,211 recites:

“An apparatus for manufacturing an image forming apparatus that includes an electron source and a phosphor film for being irradiated with an electron emitted from the electron source, the electron source including a plurality of electron-emitting devices, each of which includes a pair of electrodes, a carbon film, and a conductive film, the carbon film and the conductive film being arranged between the pair of electrodes, the apparatus comprising:

an envelope for housing, within a sealed atmosphere, a substrate, a plurality of pairs of electrodes arranged on the substrate, and conductive films, each conductive film being arranged between a respective one of the pairs of electrodes;
an exhausting device for exhausting the sealed atmosphere inside of said housing;
a gas introducing line for introducing an organic material gas into the sealed atmosphere inside of said envelope;
a moisture remover provided in the middle of said gas introducing line; and
a power source for applying a voltage between each of the pairs of electrodes. “

Claim 10 of U.S. Patent 6,267,636 recites:

“A method for manufacturing an electron emission element comprising between its electrodes a conductive film having an electron emission section, the method comprising the steps of

forming a gap in the conductive film located between the electrodes, and
applying a voltage between the electrodes in a chamber from which moisture has been removed, in an atmosphere of an aromatic compound having a polarity or a polar group.”

It is respectfully submitted that, unlike Claim 16 of the present application, Claim 3 of U.S. Patent 6,379,211 and Claim 10 of U.S. Patent 6,267,636 do not recite or

suggest heating a chamber before a step of introducing a gas containing carbon into a sealed atmosphere formed by the chamber, as recited in Claim 16 of the present application.¹

With regard to Yamanobe '130, the Office Action relies on page 4, lines 8-13 of that reference in support of the double patenting rejection. This portion of Yamanobe '130 discloses that the time required for an activation process can vary significantly or the properties of the substance deposited on the electron-emitting region can be modified due to water, oxygen, CO, and/or CO₂ existing in the atmosphere of a vacuum chamber if a very low pressure classified as a vacuum is used. The problem can give rise to deviations in the performance of electron-emitting devices of an electron source.

The Office Action alleges that "[t]o include a heating step to remove water from the chamber would have been obvious since it is well known to remove water by evaporation." However, in Applicants' view, while Yamanobe '130 may be well-suited for its intended purpose, that reference simply does not teach or suggest heating a chamber before a step of introducing a gas containing carbon into a sealed atmosphere formed by the chamber, as recited in Claim 16.

Since neither Claim 3 of U.S. Patent 6,379,211 nor Claim 10 of U.S. Patent 6,267,636 recite or suggest heating a chamber before a step of introducing a gas containing carbon into a sealed atmosphere formed by the chamber, and nothing in Yamanobe '130 would teach or suggest the same feature, Claim 16 is clearly patentably distinct from the

^{1/} Neither do Claims 3 and 10 recite or suggest a method for manufacturing an electron source, as recited in Claim 16. Instead, those claims are directed to an apparatus for manufacturing an image forming apparatus and a method for manufacturing an electron emission element, respectively. For this reason alone, it is believed that the method of Claim 16 is patentably distinct from the subject matter of Claims 3 and 10.

mentioned subject matter relied on by the Examiner. Accordingly, it is believed that the double patenting rejection of Claim 16 has been obviated, and its withdrawal is therefore respectfully requested.

If the Examiner is not persuaded to remove the double patenting rejection in view of the foregoing comments, he is respectfully requested to (a) point out which portion of the relied-on Claims 3 and 10 or Yamanobe '130 teaches heating a chamber before introducing a gas containing carbon into a sealed atmosphere formed by the chamber, as recited in Claim 16, and (b) explain how Claim 16 cannot be patentably distinct from the Claims 3 and 10 when Claim 16 is directed to a method for manufacturing an electron source, and Claims 3 and 10 are directed to an apparatus for manufacturing an image forming apparatus and a method for manufacturing an electron emission element, respectively.

With regard to the rejection under 35 U.S.C. § 102(e), Applicants submit that, according to Japanese document JP10-188788, a heating step is conducted during exhausting to heat a substrate (Fig. 1) on which a plurality of electron-emitters 5 are to be formed.

According to col. 16, lines 49-63 of Yamanobe '569, a first substrate 1 is disposed in a vacuum processing apparatus as shown in Fig. 6 of that reference. The substrate was heated while removing water and the like by evacuating the inside of the apparatus. Then, the first substrate 1 was heated in hydrogen in order to reduce fine particles of nickel oxide to provide fine particles of nickel metal. Then, methane was introduced into the vacuum chamber while maintaining the pressure at 10 Torr.

Applicants respectfully submit that, while Japanese document JP10-188788 and Yamanobe '569 may refer to heating a *substrate*, nothing in either reference would teach or suggest heating a chamber before a step of introducing a gas containing carbon into a sealed atmosphere formed by the chamber, as set forth in Claim 16. Accordingly, it is believed that the Section 102(e) rejection has been overcome, and its withdrawal is therefore respectfully requested.

The Section 103(a) rejection set forth in the Office Action will now be addressed.

Nishimura et al., the primary reference, relates to a method of manufacturing an electron-emitting device, and teaches at col. 10, line 23 et seq. that in an activation process, a pulse voltage may be repeatedly applied to a device in an atmosphere of a gas of an organic substance. Organic substances that can be used for the activation process include those described at col. 10, lines 38-48. As a result of the activation process, carbon or a carbon compound is deposited on the device out of the organic substances existing in the atmosphere to remarkably change the device current I_f and the emission current I_e .

Nishimura et al. is cited in the Office Action for teaching at col. 10, lines 7-52 that "it is well known to introduce the carbon as a gas in an activation step for surface conduction emitter in which a voltage is applied to the electro-conductive member during activation." However, while Nishimura et al. may be well-suited for its intended purpose, nothing in that reference would teach or suggest heating a chamber before a step of introducing a gas containing carbon into a sealed atmosphere formed by the chamber, as recited in Claim 16.

Yamanobe '130 teaches that the time required for an activation process can vary significantly or properties of a substance deposited on an electron-emitting region can be modified remarkably due to the water, hydrogen, oxygen, Co, and/or CO₂ existing in the atmosphere of a vacuum chamber (*see* page 4, lines 8-10). Referring to page 4, lines 55-58 of Yamanobe '130, it is described that "there has been a strong demand for a novel method of manufacturing an image-forming apparatus and a manufacturing apparatus to be used with such a method, with which the image-forming apparatus is free from the above problems and can get rid of recontamination due to readsorption of water and gaseous substances including oxygen, hydrogen, CO and CO₂ by the degased component." However, while Yamanobe '130 may be well-suited for its intended purpose, nothing in that reference would teach or suggest heating a chamber before a step of introducing a gas containing carbon into a sealed atmosphere formed by the chamber, as recited in Claim 16.

Since neither Nishimura et al. nor Yamanobe '130 teaches the foregoing feature of Claim 16, even if those references were to be combined in the manner proposed in the Office Action (which, in any event, is not admitted would have been obvious, suggested, or technically feasible), the resulting combination also would not teach or suggest that feature. Accordingly, Claim 16 is deemed clearly patentable over Nishimura et al. and Yamanobe '130, whether considered separately or in combination. Moreover, because neither Nishimura et al. nor Yamanobe '130 teaches or suggests the above-emphasized feature of Claim 16, it is believed that no *prima facie* case of obviousness has been sufficiently established against that claim, since "[t]o establish *prima facie* obviousness

of a claimed invention, all the claim limitations must be taught or suggested by the prior art." MPEP § 2143.03 (citing *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974)).

In view of the foregoing arguments, withdrawal of the Section 103(a) rejection of Claim 16 is respectfully requested.

Independent Claims 17, 18, 20, 22, and 24 recite features that are similar in many relevant respect to those of Claim 16 emphasized above, and also are believed to be clearly patentable over the prior art relied on in the Office Action for substantially the same reasons as is Claim 16.

A review of the other art of record, has failed to reveal anything which, in Applicants' opinion, would remedy the deficiencies of the art discussed above, as references against the independent claims herein. Those claims are therefore believed patentable over the art of record.

The other claims in this application are each dependent from one or another of the independent claims discussed above and are therefore believed patentable for the same reasons. Since each dependent claim is also deemed to define an additional aspect of the invention, however, the individual reconsideration of each on its own merits is respectfully requested.

In view of the foregoing remarks, Applicants respectfully request favorable reconsideration and early passage to issue of the present application.

Applicants' undersigned attorney may be reached in our New York office by telephone at (212) 218-2100. All correspondence should continue to be directed to our below listed address.

Respectfully submitted,



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